Amendments to the Claims:

Please amend the claims in the manner set forth below.

1. (currently amended) A gas sensor ~~for use in a~~ system for monitoring gas concentrations in flue gas generated by a combustor, the gas sensor system comprising:

a gas sensor comprising:

an outer shell disposed in a stream of flue gas in a post-flame zone of the combustor, the outer shell having at least one opening in a fluid communication with the flue gas;

a solid electrolyte cell disposed within the outer shell;

at least one seal cooperating with the electrolyte cell to form a sensing chamber isolated from the flue gas;

a first electrode ~~with an associated time constant~~ disposed within the sensing chamber and being isolated from the flue gas so as not to be in a direct fluid contact with the flue gas; and

a second electrode ~~with an associated time constant that is different from the time constant associated with the first electrode,~~ disposed in the outer shell and positioned in close proximity to the at least one opening so as to be in fluid contact with the flue gas, a voltage being generated across the first and second electrodes representing at least two conditions, wherein the first electrode and the second electrode generate a signal comprised of a DC component and a fluctuating AC component, the two conditions comprised of the DC component and a fluctuating AC component; and

the gas sensor system further comprising a processing portion, the processing portion analyzing each of the DC component and a fluctuating AC component to determine gas concentrations in the flue gas.

2. (currently amended) The gas sensor system of claim 1, further comprising a reference gas conduit disposed in the sensing chamber and adapted to supply a reference gas to the chamber.

3. (currently amended) The gas sensor system of claim 1, further comprising a conduit disposed within the outer shell and adjacent the electrolyte cell and second electrode, the conduit being in fluid communication with the flue gas.

4. (currently amended) The gas sensor system of claim 3, wherein the conduit delivers a calibration gas in close proximity to the second electrode, the second electrode being effectively calibrated based at least in part on the effect of the calibration gas on the condition sensed by the second electrode.

5. (currently amended) The gas sensor system of claim 4, wherein the calibration gas comprises an essentially fixed concentration of O_2.

6. (currently amended) The gas sensor system of claim 3, wherein sample flue gas is extracted from the sensor through the conduit for delivery to a reference gas analyzer.

7. (currently amended) The gas sensor system of claim 1, wherein the solid electrolyte cell is tubular in shape, the sensor comprising two seals disposed substantially at respective ends of the electrolyte cell to cooperate to form the sensing chamber.

8. (currently amended) The gas sensor system of claim 1, further comprising a thermocouple located in close proximity to the electrolyte cell and being adapted to monitor temperature and provide a reference to adjust for varying temperature conditions in the outer shell.

9. (currently amended) The gas sensor system of claim 1, wherein the first electrode is in fluid contact with a reference gas and a voltage signal generated across the first and second electrodes is analyzed to monitor the concentration of gases in the flue gas.

10. (currently amended) The gas sensor system of claim 9, wherein the voltage signal represents the concentration of at least two selected from the group~~one or more~~ consisting of oxygen, carbon monoxide, and nitric oxide.

11. (currently amended) The gas sensor system of claim 1 further comprising a third electrode disposed within the outer shell and being in fluid communication with the flue gas, the third electrode cooperating with one of the first and second electrodes to sense the concentration of an intended gas in the flue gas, the intended gas being one of a group consisting of oxygen, carbon monoxide, and nitric oxides.

12. (currently amended) The gas sensor system of claim 1, wherein the third electrode is at least in part covered by a filter to react with a second gas in the flue gas to eliminate the effect of the second gas so as to enhance the accuracy of the concentration measured of the intended gas.

13. (currently amended) The gas sensor system of claim 11, wherein the first and second electrodes cooperate to generate a first signal representing the concentration of a first intended gas and the second and third electrodes cooperate to generate a second signal representing the concentration of a second intended gas, the first and second intended gases each being one of a group consisting of oxygen, carbon monoxide, and nitric oxides.

14. (currently amended) The gas sensor system of claim 13, wherein one the first and second signals may be further analyzed to determine the concentration of a third intended gas.

15. (currently amended) The gas sensor system of claim 1, wherein electrical signals representing the gas concentrations respectively sensed by the first and second electrodes are generated, the signals being processed by the system in ~~one or more of~~ a time ~~or frequency~~ domain to yield combustion parameters, the processing portion calculating the standard deviation of signal fluctuation of the AC component.

16. (canceled)

17. (currently amended) The gas sensor system of claim 1, wherein the combustor is one of the group consisting of a boiler, a furnace, and a gas turbine.

18. (currently amended) The gas sensor system of claim 1, wherein the combustor includes a burner that generates flue gases, the burner being one ~~of~~ selected from the group consisting of a gas-fired burner, a coal-fired burner, an oil-fired burner, and a fossil fuel-fired burner.

19. (currently amended) The gas sensor system of claim 1, wherein the first and second electrodes are made from a material that is porous and catalytic.

20. (currently amended) The gas sensor system of claim 1, wherein the electrolyte cell has one closed end.

21. (canceled)

22. (currently amended) The gas sensor system of claim ~~21~~1, wherein the DC component is processed by the processing portion in accordance with the Nernst equation and is used to determine the O_2 concentration.

23. (currently amended) The gas sensor system of claim ~~21~~22, wherein the AC component is processed by the processing portion to determine the concentration of at least one ~~of~~ selected from the group consisting of carbon monoxido, nitric oxides and gaseous combustibles.

24. (canceled)

25. (currently amended) The gas sensor system of claim ~~24~~1, wherein the DC component is analyzed by the processing portion to determine an O_2 concentration in the flue gas.

26. (currently amended) The gas sensor system of claim ~~24~~25, wherein the fluctuating AC component is analyzed by the processing portion to determine a parameter representing the concentration of combustibles in the flue gas.

27. (currently amended) The gas sensor system of claim ~~24~~1, wherein the fluctuating AC component is analyzed by the processing portion to determine a concentration in the flue gas of at least one selected from ~~of~~ the group consisting of carbon monoxide, and nitric oxides.

28. (currently amended) The gas sensor system of claim 1, wherein a support conduit is disposed in the post flame zone of the combustor and at one end is supported by and affixed to a wall of the combustor, the gas sensor being at one end attached and supported by the support conduit, electrical leads being connected to the first and second electrodes and being disposed in the support conduit at the one end of the support conduit.

29. (currently amended) The gas sensor system of claim 1, wherein the electrolyte cell is comprised of yttria stabilized zirconia.

30. (currently amended) The gas sensor system of claim 1, wherein the electrolyte cell is comprised of zirconia

31. (currently amended) An emissions monitoring system for monitoring constituent concentration of flue gas components in a combustor, the monitoring system comprising:

a first sampling probe comprising:

______an outer shell disposed in a stream of flue gas in a post-flame zone of the combustor,-the outer shell having at least one opening for receiving a flue gas;

______at least one seal cooperating with the electrolyte cell to form a sensing chamber isolated from the flue gas;

a first electrode ~~with an associated time constant~~ disposed within the sensing chamber and being isolated from the flue gas so as not to be in a direct fluid contact with the flue gas;

a second electrode ~~with an associated time constant that is different from the time constant associated with the first electrode~~, disposed in the outer shell and positioned in close proximity to the at least one opening so as to be in fluid contact with the flue gas, a voltage being generated across the first and second electrodes representing at least two conditions;

a second sampling probe ~~of the same type as the first sampling probe~~ for monitoring the concentration of a second flue gas component, the second sampling probe comprising:

an outer shell disposed in a stream of flue gas in a post-flame zone of the combustor, the outer shell having at least one opening for receiving a flue gas;

at least one seal cooperating with the electrolyte cell to form a sensing chamber isolated from the flue gas;

a first electrode with an associated time constant disposed within the sensing chamber and being isolated from the flue gas so as not to be in a direct fluid contact with the flue gas;

a second electrode with an associated time constant that is different from the time constant associated with the first electrode, disposed in the outer shell and positioned in close proximity to the at least one opening so as to be in fluid contact with the flue gas, a voltage being generated across the first and second electrodes representing at least two conditions; and

at least one analyzer having inputs for monitoring the receiving the voltages generated by the first and second sampling probes and having a processor for analyzing the voltage data to determine the concentrations of the first and second flue gas components, the voltage data includes a DC component and a fluctuating AC component, the analyzer analyzing each of the DC component and a fluctuating AC component to determine the constituent concentration of flue gas components.

32. (previously withdrawn) In an emissions monitoring system used in a combustor operation, a method for monitoring the concentration of constituent gases in a flue gas generated by the combustor operation, the method comprising the steps of:

sampling the flue gas by a gas sensor disposed in a post-flame zone of a combustor;

placing a first porous electrode in a sensing chamber defined at least in part by a solid electrolyte cell and isolating the first electrode from the flue gas;

disposing a second porous electrode opposite the first electrode with a portion of the solid electrolyte cell disposed therebetween and placing the second electrode in fluid communication with the flue gas; and

analyzing a voltage generated across the first and second electrodes to determine concentrations of two constituent gases in the flue gas.

33. (previously withdrawn) The method of claim 32 further comprising the step of providing a reference gas to the sensing chamber.

34. (previously withdrawn) The method of claim 32 further comprising the step of providing a calibration gas to impinge upon the second electrode and analyzing the change in the voltage to adjust a parameter related to at least one constituent gas concentration.

35. (previously withdrawn) The method of claim 32 further comprising the steps of:

placing a third porous electrode opposite the first electrode with a portion of the solid electrolyte disposed therebetween and placing the third electrode in fluid communication with the flue gas; and

analyzing a voltage generated across the first and third electrodes to determine the concentration of a constituent gas in the flue gas.

36. (previously withdrawn) The method of claim 35, wherein the constituent gases are from the group consisting of: oxygen; carbon monoxide; and nitric oxides.

37. (previously withdrawn) The method of claim 32, wherein the constituent gases are from the group consisting of: oxygen; carbon monoxide; and nitric oxides.

38. (currently amended) The gas sensor system of claim 1, wherein the first electrode possesses a first associated time constant and the second electrode possesses a second associated time constant, the first time constant being different than the second time constant; and

wherein each of the time constants respectively associated with the first electrode and the second ~~electrodes~~ electrode is calculated by the processing portion using:

$$C_E = C_C + \Delta C_C * (1-e^{-t/Tc})$$

wherein:

C_E = the concentration of oxygen at the electrode,

C_C = the concentration of oxygen in the environment,

ΔC_C = the change in concentration of oxygen in the environment,

e = the exponential operator,

t = the time elapsed since the change in oxygen concentration occurred, and

Tc is the time constant specific to the electrode;

wherein each time constant, as calculated by the processing portion, determines how quickly the oxygen concentration level at that electrode changes.

39. (currently amended) The monitoring system of claim 31, wherein the first electrode, of the first sampling probe, possesses a first associated time constant and the second electrode, of the first sampling probe, possesses a second associated time constant, the first time constant being different than the second time constant; and

wherein each of the time constants respectively associated with the first electrode and second electrode ~~electrodes~~ is calculated by the analyzer using:

$$C_E = C_C + \Delta C_C * (1-e^{-t/Tc})$$

wherein:

C_E = the concentration of oxygen at the electrode,

C_C = the concentration of oxygen in the environment,

ΔC_C = the change in concentration of oxygen in the environment,

e = the exponential operator,

t = the time elapsed since the change in oxygen concentration occurred, and

Tc is the time constant specific to the electrode;

wherein each time constant, as calculated by the analyzer, determines how quickly the oxygen concentration level at that electrode changes.

40. (currently amended) The gas sensor system of claim 1, further comprising a flexible hose connected to the gas sensor, the flexible hose for facilitating the assembly and installation of ~~said~~ the gas sensor into said combustor.

41. (currently amended) The monitoring system of claim 31, further comprising a flexible hose connected to at least one of the first sampling probe and the second sampling probe, the flexible hose for facilitating the assembly and installation of at least one of the first sampling probe and the second sampling probe ~~said gas sensor~~ into said combustor.

42. (new) The monitoring system of claim 31, wherein the ~~analzer~~analyzer:

analyzing the DC component to determine an O_2 concentration in the flue gas; and

analyzing the fluctuating AC component to determine a parameter representing the concentration of combustibles in the flue gas.